

**WHAT IS CLAIMED IS:**

1. Apparatus (20, 20b) for coating a traveling paper web (W) with a film of coating, the apparatus operatively associated with an adjacent backing roll (14, 14b) and comprising, in combination:
    - a coater head (22, 22b) having an inlet (24, 24b) for receiving a supply of fresh coating;
    - a mixing chamber (26, 26b) in the coater head in fluid communication with the inlet for receiving the supply of fresh coating;
    - a feed channel (28, 28b) in the coater head in fluid communication with the mixing chamber for receiving coating from the mixing chamber;
    - a baffle (30, 30b) mounted in the apparatus and operatively associated with the feed channel (28, 28b) and having an edge (32, 32b) disposed in spaced adjacency with the surface (15) of the backing roll, and substantial parallel thereto, so as to form an overflow gap (60, 60b) with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;
    - a coating chamber (18, 18b) in the coater head in fluid communication with the feed channel, and so constructed and arranged as to be open toward the backing roll for applying a film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface;
- recirculation means (48, 50, 54, 58; 48b, 50b, 54b, 58b) in the

coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head;

the recirculation means including a channel (54) being so constructed and arranged as to direct the flow of returning coating into the mixing chamber at an acute angle to the flow of fresh coating received in the mixing chamber from the inlet.

2. Apparatus for coating a traveling paper web as set forth in claim 1, wherein:

a flexible blade is (36, 36b) mounted in the coater head to define, with the surfaces of the backing roll, the coating chamber (18, 18b) which extends downstream in the apparatus, the blade having a proximate end mounted in the coater head and a distal end extending downstream.

3. Apparatus for coating a traveling paper web as set forth in claim 1, wherein:

the coater head includes a stabilizer surface (51, 51b) for defining a part of the coating chamber for assisting in the flow of coating downstream and against either the surface of the paper web to be coated or on the surface (15) of the backing roll.

4. Apparatus for coating a traveling paper web as set forth in claim 3, further including:

a flexible blade (36, 36b) mounted in the coater head and having a distal end (38) extending downstream therein, and defining, with the surface of the backing roll (14, 14b), the coating chamber (18, 18b) on one surface (49) of the blade, and defining, with the coater head, a recirculation channel (54, 54b) on the other surface (52, 52b) of the blade.

5. Apparatus for coating a traveling paper web as set forth in claim 4, wherein:

the extension of the blade from its mounting in the coater head to its distal end defines a converging coating channel (18) with the surface (15) of the backing roll.

6. Apparatus for coating a traveling paper web as set forth in claim 1, wherein:

the recirculation means includes a recirculation channel (54).

7. Apparatus for coating a traveling paper web as set forth in claim 1, wherein:

the recirculation means includes a plurality of flow metering orifices (58).

8. Apparatus for coating a traveling paper web as set forth in claim 1, further including:

a metering rod holder (42, 42b) mounted in the apparatus for holding a rotatable metering rod (40, 40b) for nipping engagement with either the coated paper web or the surface of the associated backing roll downstream of the coating chamber;  
a metering rod (40, 40b) rotatably mounted in the metering rod holder.

9. Apparatus for coating a traveling paper web set forth in claim 8, further comprising:

drive means (64, 64b) operatively connected to the metering bar for rotating the metering bar while the metering bar is in nipping, coating metering engagement with the coating material

against either the coated web (W) or the surface of the backing roll.

10. A method for coating a traveling paper web (W) with a film of coating, the paper web being either supported on the surface of a rotatable backing roll, or nipped against the surface (15) of the backing roll (14, 14b), the method comprising the steps of:

- 1) introducing a fresh supply of coating (25, 25b) into a coater head (22, 22b);
- 2) directing the fresh supply of coating into a mixing chamber (26, 26b) in the coater head;
- 3) flowing the coating from the mixing chamber into, and through, a feed channel (28, 28b) in the coater head;
- 4) dividing the coating exiting the feed channel into first and second portions (12, 11; 12b, 11b);
- 5) directing the first portion (12, 12b) into a coating chamber in the coater head, and directing the second portion (11, 11b) over a baffle (30, 30b) disposed in spaced adjacency with either the paper web supported on the backing roll, or the surface of the backing roll, to define a gap (60, 60b) therebetween, the second portion being sufficient to seal the gap from air moving with either the traveling paper web or the surface of the backing roll;
- 6) flowing the coating in the coating chamber in the downstream direction therein while maintaining a pressurized interface between the coating material and either the paper web, when the paper web is supported on the surface of the backing roll, or the surface of the backing roll, when the paper web is nipped against the surface of the backing roll downstream of the interface;
- 7) flowing the coating from the coating chamber into a recirculation chamber (54, 54b);

8) directing the coating from the recirculation chamber into the mixing chamber (22, 22b), the direction of flow of coating from the recirculation chamber being at an acute angle to the direction of flow of the fresh supply of coating being directed into the mixing chamber;

9) mixing the coating from the recirculation chamber (54, 54b) with the fresh coating in the mixing chamber (26, 26b).